

# SEQUENCE LISTING

<110> Snutch, Terry P.  
Baillie, David L.

<120> NOVEL HUMAN CALCIUM CHANNELS AND RELATED PROBES, CELL  
LINES AND METHODS

<130> NMED.P-001-2 (CIP)

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<150> 09/030,482

<151> 1998-02-25

<150> 60/039,204

<151> 1997-02-28

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<170> PatentIn Ver. 2.0

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Val Ala Leu Pro Pro Tyr Tyr Gln Pro Glu Glu Asp Asp Glu Met Pro		



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Asp Val Tyr Asp Phe Gly Ala Gly Arg Gln Asp Leu Asn Ala Ser Gly					
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Leu Cys Val Asn Trp Asn Arg Tyr Tyr Asn Val Cys Arg Thr Gly Ser					
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Ala Asn Pro His Lys Gly Ala Ile Asn Phe Asp Asn Ile Gly Tyr Ala					
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Ser Phe Ser Thr Ala Gln Ser Pro Lys Cys Gln Gly Asp Ser Leu Pro					
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Glu Thr Gly Glu Glu Pro His Ser Trp Ser Pro Arg Ala Thr Arg Arg					
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Pro Gly Pro His Ala Lys Glu Pro Arg His Tyr Pro Leu Thr Val Trp						
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Cys Pro Cys Cys Gln His Glu Asp Gly Arg Arg Pro Ser Gly Leu Gly						
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Ser Thr Asp Ser Gly Gln Glu Gly Ser Gly Ser Gly Ser Ser Ala Gly						
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Tyr Asp Gln Arg Ser Leu Val Gly Gly Leu Arg Ala Thr Ala Gly Val 1235	1240	1245
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Gly Val Gln Leu Trp Ala Gly Leu Leu Arg Asn Arg Cys Phe Leu Glu  
35 40 45  
Glu Asn Phe Thr Ile Gln Gly Asp Val Ala Leu Pro Pro Tyr Tyr Gln  
50 55 60  
Pro Glu Glu Asp Asp Glu Met Pro Phe Ile Cys Ser Leu Ser Gly Asp

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Arg Glu Cys Cys Leu Ser Lys Asp Asp Val Tyr Asp Phe Gly Ala Gly						
	100		105		110	
Arg Gln Asp Leu Asn Ala Ser Gly Leu Cys Val Asn Trp Asn Arg Tyr						
	115		120		125	
Tyr Asn Val Cys Arg Thr Gly Ser Ala Asn Pro His Lys Gly Ala Ile						
	130		135		140	
Ser Phe Asp Asn Ile Gly Tyr Ala Trp Ile Val Ile Phe Gln Val Ile						
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Thr Leu Glu Gly Trp Val Ala Ile Met Tyr Tyr Val Met Asp Ala Leu						
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 <213> rat

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 <211> 189  
 <212> PRT  
 <213> rat



<220>

<223> rat alpha-I partial sequence

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20 25 30

Gly Val Gln Leu Trp Ala Gly Leu Leu Arg Asn Arg Cys Phe Leu Glu  
35 40 45

Glu Asn Phe Thr Ile Gln Gly Asp Val Ala Leu Pro Pro Tyr Tyr Gln  
50 55 60

Pro Glu Glu Asp Asp Glu Met Pro Phe Ile Cys Ser Leu Thr Gly Asp  
65 70 75 80

Asn Gly Ile Met Gly Cys His Glu Ile Pro Pro Leu Lys Glu Gln Gly  
85 90 95

Arg Glu Cys Cys Leu Ser Lys Asp Asp Val Tyr Asp Phe Gly Ala Gly  
100 105 110

Arg Gln Asp Leu Asn Ala Ser Gly Leu Cys Val Asn Trp Asn Arg Tyr  
115 120 125

Tyr Asn Val Cys Arg Thr Gly Asn Ala Asn Pro His Lys Gly Ala Ile  
130 135 140

Asn Phe Asp Asn Ile Gly Tyr Ala Trp Ile Val Ile Phe Gln Val Ile  
145 150 155 160

Thr Leu Glu Gly Trp Val Glu Ile Met Tyr Tyr Val Met Asp Ala His  
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<210> 23

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<212> PRT

<213> rat

<400> 24

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Pro Val Ala Ser Arg Ser Ser Thr Thr Cys Pro Gly Pro Gly Ala Ala
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Val Ile Ser Val Trp Glu Ile Val Gly Gln Gln Gly Gly Gly Leu Ser  
850 855 860

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885 890 895

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Ser Ile Leu Gly Met His Leu Phe Gly Cys Lys Phe Ala Ser Glu Arg  
915 920 925

Asp Gly Asp Thr Leu Pro Asp Arg Lys Asn Phe Asp Ser Leu Leu Trp  
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Glu Leu Thr Asn Ala Leu Glu Ile Ser Asn Ile Val Phe Thr Ser Met  
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Ser Val Trp Glu Ile Val Gly Gln Ala Asp Gly Gly Gln Ser Val Leu  
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Phe Leu Asp Lys Pro Gly Arg Pro Asp Ala Gln Arg Trp Ser Ser Val  
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Gly Thr Pro Ala Pro Ala Lys Pro Gly Pro His Ala Lys Glu Pro Ser						
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His Ser Lys Leu Cys Pro Arg His Ser Pro Leu Asp Pro Thr Pro His						
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Thr Leu Val Gln Pro Ile Ser Ala Ile Leu Ala Ser Tyr Pro Ser Ser						
	500	505		510		
Cys Pro His Cys Gln His Glu Ala Gly Arg Arg Pro Ser Gly Leu Gly						
	515	520		525		
Ser Thr Asp Ser Gly Gln Glu Gly Ser Gly Ser Gly Gly Ser Ala Glu						
	530	535		540		
Ala Glu Ala Asn Gly Asp Gly Leu Gln Ser Arg Glu Asp Gly Val Ser						
	545	550		555		560
Ser Asp Leu Gly Lys Glu Glu Glu Gln Glu Asp Gly Ala Ala Arg Leu						
	565	570		575		
Cys Gly Asp Val Trp Arg Glu Thr Arg Lys Lys Leu Arg Gly Ile Val						
	580	585		590		
Asp Ser Lys Tyr Phe Asn Arg Gly Ile Met Met Ala Ile Leu Val Asn						
	595	600		605		
Thr Val Ser Met Gly Ile Glu His His Glu Gln Pro Glu Glu Leu Thr						
	610	615		620		
Asn Ile Leu Glu Ile Cys Asn Val Val Phe Thr Ser Met Phe Ala Leu						
	625	630		635		640
Glu Met Ile Leu Lys Leu Ala Ala Phe Gly Leu Phe Asp Tyr Leu Arg						



900	905	910
Arg Met Ser Tyr Asp Gln Arg Ser Leu Ser Ser Ser Arg Ser Ser Tyr		
915	920	925
Tyr Gly Pro Gly Gly Arg Ser Gly Thr Trp Ala Ser Arg Arg Ser Ser		
930	935	940
Trp Asn Ser Leu Lys His Lys Pro Pro Ser Ala Glu His Glu Ser Leu		
945	950	955
960		
Leu Ser Gly Glu Gly Gly Gly Ser Cys Val Arg Ala Cys Glu Gly Ala		
965	970	975
Arg Glu Glu Ala Pro Thr Arg Thr Ala Pro Leu His Ala Pro His Arg		
980	985	990
His His Ala His His Gly Pro His Leu Ala His Arg His Arg His His		
995	1000	1005
Arg Arg Thr Leu Ser Leu Asp Thr Arg Asp Ser Val Asp Leu Gly Glu		
1010	1015	1020
Leu Val Pro Val Val Gly Ala His Ser Arg Ala Ala Trp Arg Gly Ala		
1025	1030	1035
1040		
Gly Gln Ala Pro Gly His Glu Asp Cys Asn Gly Arg Met Pro Asn Met		
1045	1050	1055
Ala Lys Asp Val Phe Thr Lys Met Asp Asp Arg Arg Asp Arg Gly Glu		
1060	1065	1070
Asp Glu Glu Glu Ile Asp Tyr Thr Leu Cys Phe Arg Val Arg Lys Met		
1075	1080	1085
Ile Cys Cys Val Tyr Lys Pro Asp Trp Cys Glu Val Arg Glu Asp Trp		
1090	1095	1100
Ser Val Tyr Leu Phe Ser Pro Glu Asn Lys Phe Arg Ile Leu Cys Gln		
1105	1110	1115
1120		
Thr Ile Ile Ala His Lys Leu Phe Asp Tyr Val Val Leu Ala Phe Ile		
1125	1130	1135
Phe Leu Asn Cys Ile Thr Ile Ala Leu Glu Arg Pro Gln Ile Glu Ala		
1140	1145	1150
Gly Ser Thr Glu Arg Ile Phe Leu Thr Val Ser Asn Tyr Ile Phe Thr		



1155	1160	1165
Ala Ile Phe Val Gly Glu Met Thr Leu Lys Val Val Ser Leu Gly Leu		
1170	1175	1180
Tyr Phe Gly Glu Gln Ala Tyr Leu Arg Thr Asp Trp Asn Val Leu Asp		
1185	1190	1195 1200
Gly Phe Leu Val Phe Val Ser Ile Ile Asp Ile Val Val Ser Val Ala		
1205	1210	1215
Ser Ala Gly Gly Ala Lys Ile Leu Gly Val Leu Arg Leu Leu Arg Thr		
1220	1225	1230
Leu Arg Pro Leu Arg Val Ile Ser Arg Ala Pro Gly Leu Lys Leu Val		
1235	1240	1245
Val Glu Thr Leu Ile Ser Ser Leu Lys Pro Ile Gly Asn Ile Val Leu		
1250	1255	1260
Ile Cys Cys Ala Phe Phe Ile Ile Phe Gly Ile Leu Gly Val Gln Leu		
1265	1270	1275 1280
Phe Lys Gly Lys Phe Tyr His Cys Leu Gly Val Asp Thr Arg Asn Ile		
1285	1290	1295
Thr Asn Arg Ser Asp Cys Val Ala Ala Asn Tyr Arg Trp Val His His		
1300	1305	1310
Lys Tyr Asn Phe Asp Asn Leu Gly Gln Ala Leu Met Ser Leu Phe Val		
1315	1320	1325
Leu Ala Ser Lys Asp Gly Trp Val Asn Ile Met Tyr Asn Gly Leu Asp		
1330	1335	1340
Ala Val Ala Val Asp Gln Gln Pro Val Thr Asn His Asn Pro Trp Met		
1345	1350	1355 1360
Leu Leu Tyr Phe Ile Ser Phe Leu Leu Ile Val Ser Phe Phe Val Leu		
1365	1370	1375
Asn Met Phe Val Gly Val Val Val Glu Asn Phe His Lys Cys Arg Gln		
1380	1385	1390
His Gln Glu Ala Glu Glu Ala Arg Arg Arg Glu Glu Lys Arg Leu Arg		
1395	1400	1405
Arg Leu Glu Lys Lys Arg Arg Tyr Ala Gln Arg Leu Pro Tyr Tyr Ala		



1665	1670	1675	1680
Val Leu Met Lys His Leu Asp Asp Ser Asn Lys Glu Ala Gln Glu Asp			
1685	1690	1695	
Ala Glu Met Asp Ala Glu Ile Glu Leu Glu Met Ala His Gly Ser Gly			
1700	1705	1710	
Pro Cys Pro Gly Pro Cys Pro Gly Pro Cys Pro Cys Pro Cys Pro Cys			
1715	1720	1725	
Pro Cys Ser Gly Pro Arg Cys Pro Leu Val Thr Trp Gly Ser Gly Ala			
1730	1735	1740	
Met Asp Arg Glu Gly Gln Val Leu Glu Ala His Arg Glu Ser Pro Val			
1745	1750	1755	1760
Arg Thr Ala Ile Arg Cys Trp Thr Pro Arg Val Thr Cys Ala Gly Thr			
1765	1770	1775	
Ala Ile Leu Gln Pro Arg Arg Pro Cys Gly Trp Thr Gly Ser Leu Glx			
1780	1785	1790	

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 <211> 540  
 <212> DNA  
 <213> rat

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 gctcagcagc ccagtggccc gtagtgggca ggagccccag ccagtggca gctgcactcg 180  
 ctcacaccgt cgtctgtctg tccaccacct ggtccaccac catcaccacc accatcacca 240  
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<210> 30  
 <211> 2212  
 <212> DNA  
 <213> HUMAN

<400> 30

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<210> 31

<211> 644

<212> PRT

<213> HUMAN

<400> 31

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10

15

Arg Ser Phe Met Arg Leu Asn Asp Leu Ser Gly Ala Gly Gly Arg Pro  
                   20                  25                  30  
 Gly Pro Gly Ser Ala Glu Lys Asp Pro Gly Ser Ala Asp Ser Glu Ala  
                   35                  40                  45  
 Glu Gly Leu Pro Tyr Pro Ala Leu Ala Pro Val Val Phe Phe Tyr Leu  
                   50                  55                  60  
 Ser Gln Asp Ser Arg Pro Arg Ser Trp Cys Leu Arg Thr Val Cys Asn  
                   65                  70                  75                  80  
 Pro Trp Phe Glu Arg Ile Ser Met Leu Val Ile Leu Leu Asn Cys Val  
                   85                  90                  95  
 Thr Leu Gly Met Phe Arg Pro Cys Glu Asp Ile Ala Cys Asp Ser Gln  
                   100                  105                  110  
 Arg Cys Arg Ile Leu Gln Ala Phe Asp Asp Phe Ile Phe Ala Phe Phe  
                   115                  120                  125  
 Ala Val Glu Met Val Val Lys Met Val Ala Leu Gly Ile Phe Gly Lys  
                   130                  135                  140  
 Lys Cys Tyr Leu Gly Asp Thr Trp Asn Arg Leu Asp Phe Phe Ile Val  
                   145                  150                  155                  160  
 Ile Ala Gly Met Leu Glu Tyr Ser Leu Asp Leu Gln Asn Val Ser Phe  
                   165                  170                  175  
 Ser Ala Val Arg Thr Val Arg Val Leu Arg Pro Leu Arg Ala Ile Asn  
                   180                  185                  190  
 Arg Val Pro Ser Met Arg Ile Leu Val Thr Leu Leu Leu Asp Thr Leu  
                   195                  200                  205  
 Pro Met Leu Gly Asn Val Leu Leu Leu Cys Phe Phe Val Phe Phe Ile  
                   210                  215                  220  
 Phe Gly Ile Val Gly Val Gln Leu Trp Ala Gly Leu Leu Arg Asn Arg  
                   225                  230                  235                  240  
 Cys Phe Leu Pro Glu Asn Phe Ser Leu Pro Leu Ser Val Asp Leu Glu  
                   245                  250                  255  
 Arg Tyr Tyr Gln Thr Glu Asn Glu Asp Glu Ser Pro Phe Ile Cys Ser  
                   260                  265                  270

Gln Pro Arg Glu Asn Gly Met Arg Ser Cys Arg Ser Val Pro Thr Leu  
 275 280 285

Arg Gly Asp Gly Gly Gly Gly Pro Pro Cys Gly Leu Asp Tyr Glu Ala  
 290 295 300

Tyr Asn Ser Ser Ser Asn Thr Thr Cys Val Asn Trp Asn Gln Tyr Tyr  
 305 310 315 320

Thr Asn Cys Ser Ala Gly Glu His Asn Pro Phe Lys Gly Ala Ile Asn  
 325 330 335

Phe Asp Asn Ile Gly Tyr Ala Trp Ile Ala Ile Phe Gln Val Ile Thr  
 340 345 350

Leu Glu Gly Trp Val Asp Ile Met Tyr Phe Val Met Asp Ala His Ser  
 355 360 365

Phe Tyr Asn Phe Ile Tyr Phe Ile Leu Leu Ile Ile Val Gly Ser Phe  
 370 375 380

Phe Met Ile Asn Leu Cys Leu Val Val Ile Ala Thr Gln Phe Ser Glu  
 385 390 395 400

Thr Lys Gln Arg Glu Ser Gln Leu Met Arg Glu Gln Arg Val Arg Phe  
 405 410 415

Leu Ser Asn Ala Ser Thr Leu Ala Ser Phe Ser Glu Pro Gly Ser Cys  
 420 425 430

Tyr Glu Glu Leu Leu Lys Tyr Leu Val Tyr Ile Leu Arg Lys Ala Ala  
 435 440 445

Arg Arg Leu Ala Gln Val Ser Arg Ala Ala Gly Val Arg Val Gly Leu  
 450 455 460

Leu Ser Ser Pro Ala Pro Leu Gly Gly Gln Glu Thr Gln Pro Ser Ser  
 465 470 475 480

Ser Cys Ser Arg Ser His Arg Arg Leu Ser Val His His Leu Val His  
 485 490 495

His His His His His His His His Tyr His Leu Gly Asn Gly Thr Leu  
 500 505 510

Arg Ala Pro Arg Ala Ser Pro Glu Ile Gln Asp Arg Asp Ala Asn Gly  
 515 520 525



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 actacaacgt gtgccgctcg ggtgactcca acccccacaa cggtgccatc aacttcgaca 1140  
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<210> 33

<211> 518

<212> PRT

<213> HUMAN

<400> 33

Met Thr Glu Gly Ala Arg Ala Ala Asp Glu Val Arg Val Pro Leu Gly  
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Ala Pro Pro Pro Gly Pro Ala Ala Leu Val Gly Ala Ser Pro Glu Ser  
 20 25 30

Pro Gly Ala Pro Gly Arg Glu Ala Glu Arg Gly Ser Glu Leu Gly Val  
 35 40 45

Ser Pro Ser Glu Ser Pro Ala Ala Glu Arg Gly Ala Glu Leu Gly Ala  
 50 55 60

Asp Glu Glu Gln Arg Val Pro Tyr Pro Ala Leu Ala Ala Thr Val Phe  
 65 70 75 80

Phe Cys Leu Gly Gln Thr Thr Arg Pro Arg Ser Trp Cys Leu Arg Leu  
 85 90 95

Val Cys Asn Pro Trp Phe Glu His Val Ser Met Leu Val Ile Met Leu  
 100 105 110

Asn Cys Val Thr Leu Gly Met Phe Arg Pro Cys Glu Asp Val Glu Cys  
 115 120 125

Gly Ser Glu Arg Cys Asn Ile Leu Glu Ala Phe Asp Ala Phe Ile Phe  
 130 135 140

Ala Phe Phe Ala Val Glu Met Val Ile Lys Met Val Ala Leu Gly Leu  
 145 150 155 160

Phe Gly Gln Lys Cys Tyr Leu Gly Asp Thr Trp Asn Arg Leu Asp Phe



	165		170		175
Phe Ile Val Val Ala Gly Met Met Glu Tyr Ser Leu Asp Gly His Asn					
	180		185		190
Val Ser Leu Ser Ala Ile Arg Thr Val Arg Val Leu Arg Pro Leu Arg					
	195		200		205
Ala Ile Asn Arg Val Pro Ser Met Arg Ile Leu Val Thr Leu Leu Leu					
	210		215		220
Asp Thr Leu Pro Met Leu Gly Asn Val Leu Leu Leu Cys Phe Phe Val					
	225		230		235
Phe Phe Ile Phe Gly Ile Val Gly Val Gln Leu Trp Ala Gly Leu Leu					
	245		250		255
Arg Asn Arg Cys Phe Leu Asp Ser Ala Phe Val Arg Asn Asn Asn Leu					
	260		265		270
Thr Phe Leu Arg Pro Tyr Tyr Gln Thr Glu Glu Gly Glu Glu Asn Pro					
	275		280		285
Phe Ile Cys Ser Ser Arg Arg Asp Asn Gly Met Gln Lys Cys Ser His					
	290		295		300
Ile Pro Gly Arg Arg Glu Leu Arg Met Pro Cys Thr Leu Gly Trp Glu					
	305		310		315
Ala Tyr Thr Gln Pro Gln Ala Glu Gly Val Gly Ala Ala Arg Asn Ala					
	325		330		335
Cys Ile Asn Trp Asn Gln Tyr Tyr Asn Val Cys Arg Ser Gly Asp Ser					
	340		345		350
Asn Pro His Asn Gly Ala Ile Asn Phe Asp Asn Ile Gly Tyr Ala Trp					
	355		360		365
Ile Ala Ile Phe Gln Val Ile Thr Leu Glu Gly Trp Val Asp Ile Met					
	370		375		380
Tyr Tyr Val Met Asp Ala His Ser Phe Tyr Asn Phe Ile Tyr Phe Ile					
	385		390		395
Leu Leu Ile Ile Val Gly Ser Phe Phe Met Ile Asn Leu Cys Leu Val					
	405		410		415
Val Ile Ala Thr Gln Phe Ser Glu Thr Lys Gln Arg Glu Ser Gln Leu					

420

425

430

Met Arg Glu Gln Arg Ala Arg His Leu Ser Asn Asp Ser Thr Leu Ala  
 435 440 445

Ser Phe Ser Glu Pro Gly Ser Cys Tyr Glu Glu Leu Leu Lys Tyr Val  
 450 455 460

Gly His Ile Phe Arg Lys Val Lys Arg Arg Ser Leu Arg Leu Tyr Ala  
 465 470 475 480

Arg Trp Gln Ser Arg Trp Arg Lys Lys Val Asp Pro Ser Ala Val Gln  
 485 490 495

Gly Gln Gly Pro Gly His Arg Gln Arg Arg Ala Gly Arg His Thr Ala  
 500 505 510

Ser Val His His Leu Val  
 515

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 <211> 1080  
 <212> DNA  
 <213> HUMAN

<400> 34  
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 acagcctcaa gcacaagccg ccgtcggcgg agcatgagtc cctgctctct gcggagcgcg 180  
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<210> 35  
 <211> 359

<212> PRT  
<213> HUMAN

<400> 35

Ser Val Met Ser Leu Gly Arg Met Ser Tyr Asp Gln Arg Ser Leu Ser  
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Ser Ser Arg Ser Ser Tyr Tyr Gly Pro Trp Gly Arg Ser Ala Ala Trp  
20 25 30

Ala Ser Arg Arg Ser Ser Trp Asn Ser Leu Lys His Lys Pro Pro Ser  
35 40 45

Ala Glu His Glu Ser Leu Leu Ser Ala Glu Arg Gly Gly Gly Ala Arg  
50 55 60

Val Cys Glu Val Ala Ala Asp Glu Gly Pro Pro Arg Ala Ala Pro Leu  
65 70 75 80

His Thr Pro His Ala His His Ile His His Gly Pro His Leu Ala His  
85 90 95

Arg His Arg His His Arg Arg Thr Leu Ser Leu Asp Asn Arg Asp Ser  
100 105 110

Val Asp Leu Ala Glu Leu Val Pro Ala Val Gly Ala His Pro Arg Ala  
115 120 125

Ala Trp Arg Ala Ala Gly Pro Ala Pro Gly His Glu Asp Cys Asn Gly  
130 135 140

Arg Met Pro Ser Ile Ala Lys Asp Val Phe Thr Lys Met Gly Asp Arg  
145 150 155 160

Gly Asp Arg Gly Glu Asp Glu Glu Glu Ile Asp Tyr Thr Leu Cys Phe  
165 170 175

Arg Val Arg Lys Met Ile Asp Val Tyr Lys Pro Asp Trp Cys Glu Val  
180 185 190

Arg Glu Asp Trp Ser Val Tyr Leu Phe Ser Pro Glu Asn Arg Phe Arg  
195 200 205

Val Leu Cys Gln Thr Ile Ile Ala His Lys Leu Phe Asp Tyr Val Val  
210 215 220

Leu Ala Phe Ile Phe Leu Asn Cys Ile Thr Ile Ala Leu Glu Arg Pro  
225 230 235 240

Tyr Ile Phe Thr Ala Ile Phe Val Gly Glu Met Thr Leu Lys Val Val  
260 265 270

Asn Val Leu Asp Gly Phe Leu Val Phe Val Ser Ile Ile Asp Ile Val  
290 295 300

Val Leu Arg Leu Leu Arg Thr Leu Arg Pro Leu Arg Val Ile Ser Arg  
325 330 335

Pro Ile Gly Asn Ile Val Leu  
355

$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta(x-a) dx = f(a)$